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# **Systems Analysis CSP Peer-Review 2001**

**Hank Price**

**Greg Kolb**

**Scott Jones**

**Others...**



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# What is Systems Analysis

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- **System Performance and Cost**
- **System Optimization (size, qty of storage, etc.)**
- **Typically differentiated by the wide scope of the analysis that includes interdependent elements of the system or by the cross-cutting nature of the analysis**
- **Analyses initiated by**
  - **Industry request**
  - **Programmatic activity**



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# Systems Analysis Tools

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- **Solar Optics Modeling and Design Codes**
  - Cone Optics: HELIOS, DELSOL, CIRCE,
  - Ray Trace: MIRVAL, SolTRACE
- **System and Subsystem Performance Modeling Codes**
  - SOLERGY, Excelergy, TRNSYS, GateCycle, Aspen
- **Cost Models**
  - Capital cost models
  - Economic and financial (cash flow) models
- **Validate & refine models w/ real-life experience**
- **Both the analyses and the tool themselves are products**

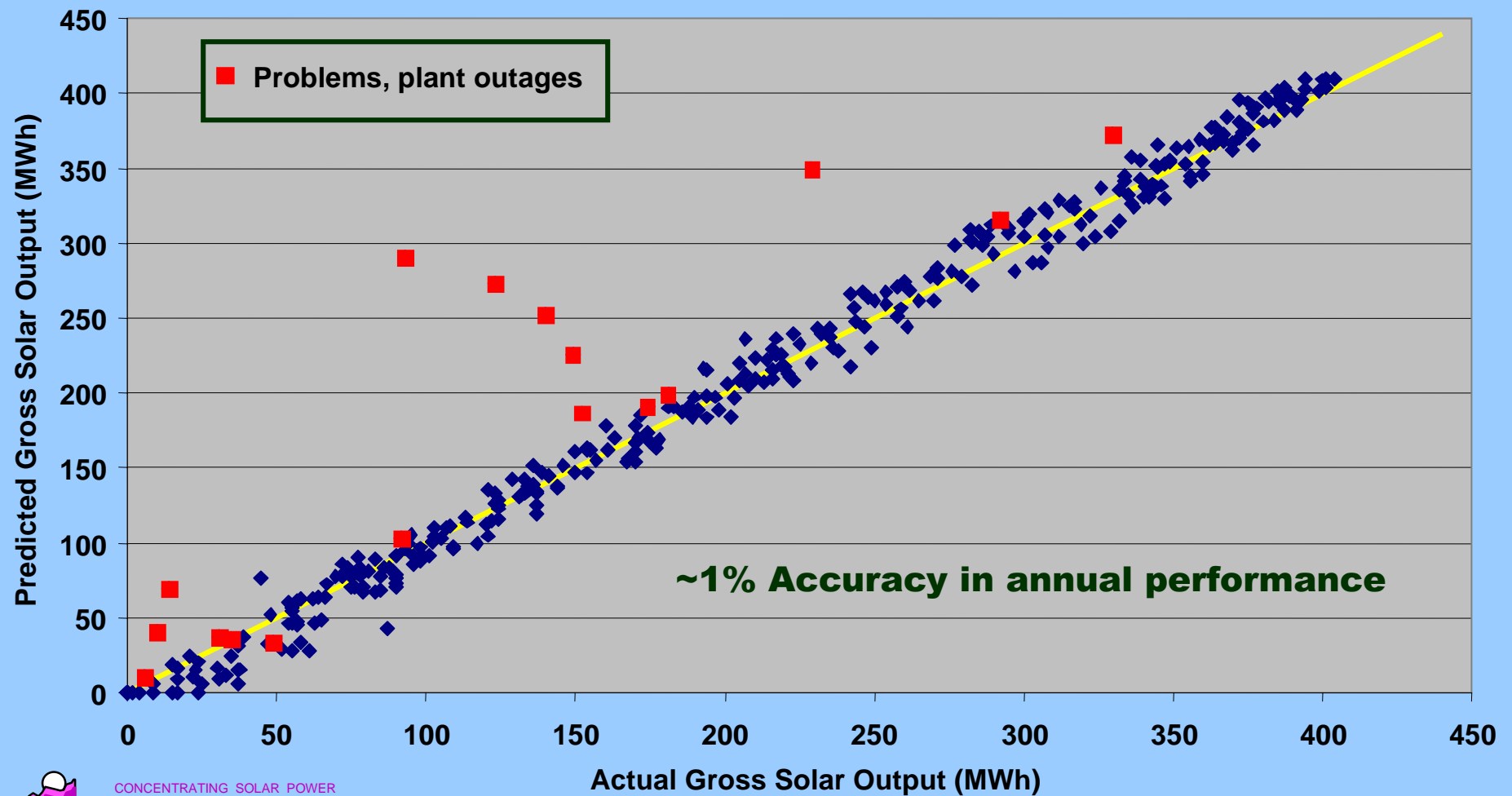


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# Excelergy vs. Actual for SEGS VI in 1999



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# Systems Analysis Activities

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- **DOE/EPRI Technology Characterization report on the potential renewable energy cost reductions out to 2020**
- Support to external technology assessments (Teagan, Morse, RDI)
- Support to industry w/ technology roadmaps
- **Renewable taxation issues. Tax equity reduces costs by ~1/3.**
- System studies at request of industry partners
- Small systems assessment (e.g. modular troughs, markets)
- **Impact and cost of incentives for CSP Inc. proposed Southwest Solar Resource Development Act**



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# Systems Analysis Activities Cont'd

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- **Technical consultant to World Bank/GEF**
  - GEF Goal is clean energy technologies in developing countries
  - ISSCS Crisis & TIPP projects analyzed hybrid solar/fossil systems preferred by World Bank
  - Enermodal analysis of total cost to commercialize CSP  
\$1-3B (60% paid by GEF) for an industry producing ~\$2B/year
- SolarPACES Start Missions & follow-up (e.g. siting issues)
- South African Utility (Eskom) study
- Review of IEA report on the worldwide GHG reduction potential of CSP (planned)
- Review of market penetration predictions (EIA/NEMS)



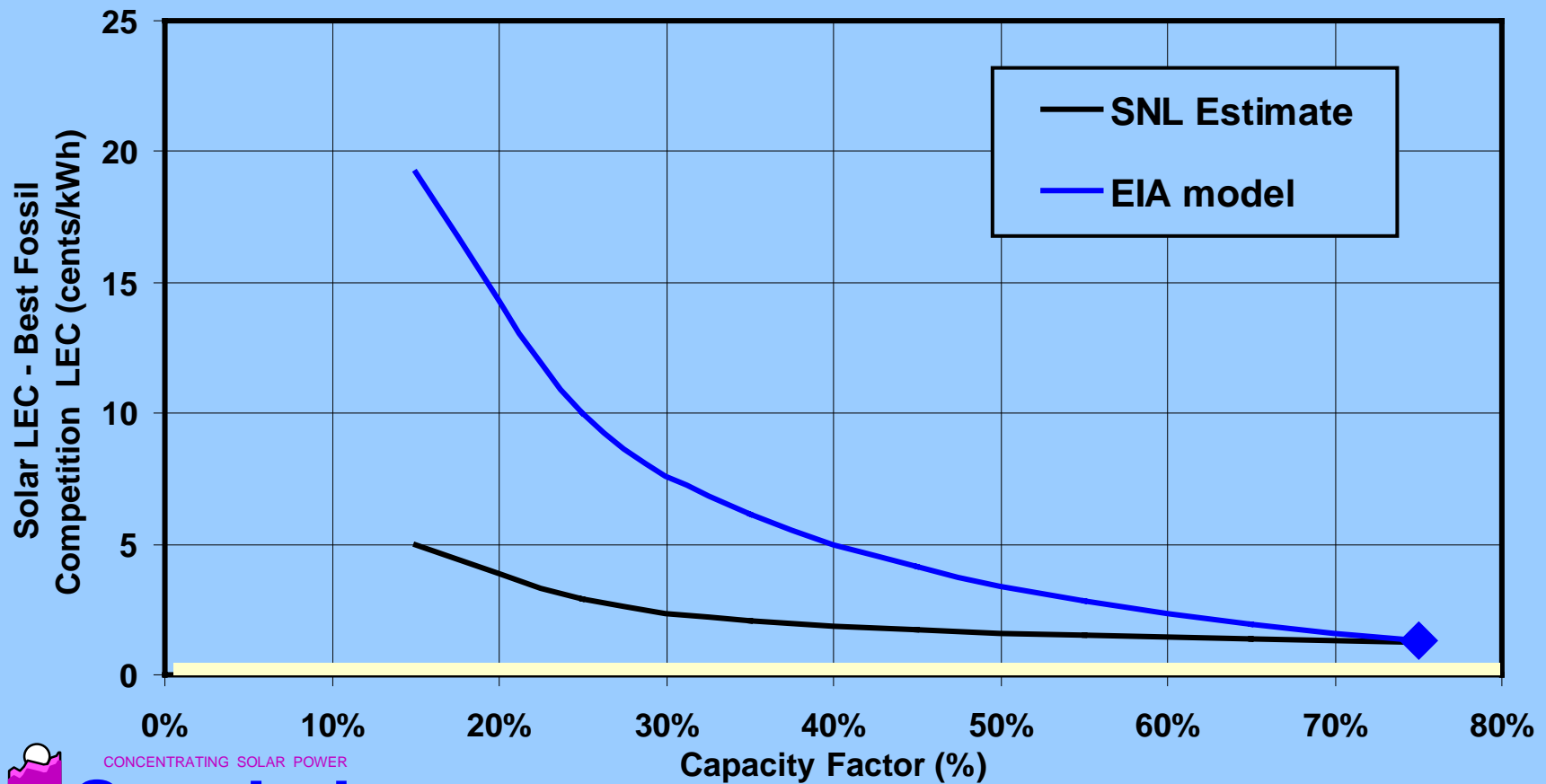
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# EIA/NEMS Results

Year 2020 Delta Wholesale Cost of Electricity  
AEO2001 HiRenew Case (TC costs) for Solar Thermal Towers in NERC 13 (Calif) versus  
the Best Fossil Competition

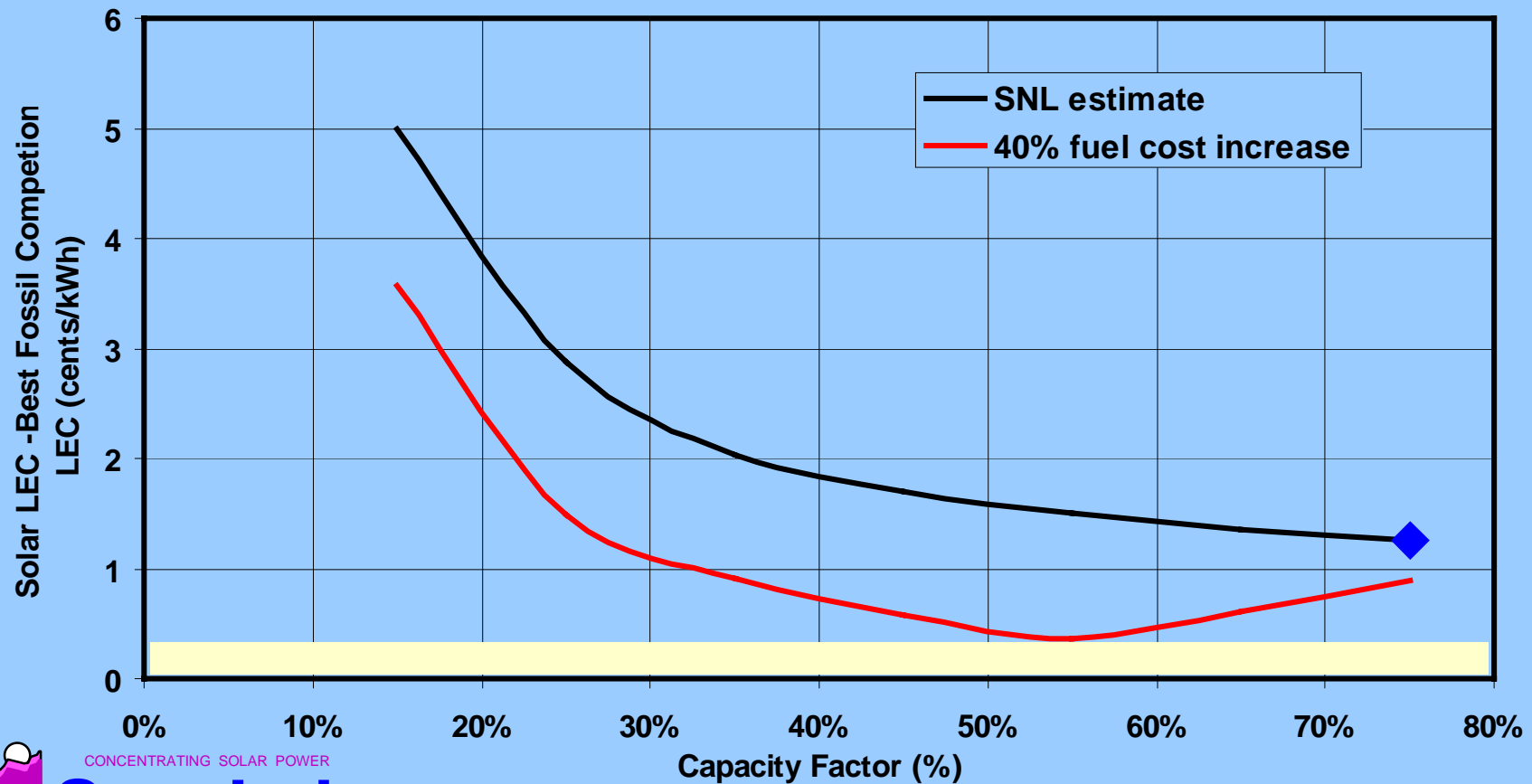


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